Partnering to Establish an International Joint Engineering Degree Program

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KEYWORDS: *joint program, international cooperation, partnership*
ABSTRACT: *Affordable airline travel, the ease of web-based communication, and other factors have contributed significantly to the globalization of industry. Multi-national companies are now the rule rather than the exception in the 21st century. The same factors that have globalized the economy have also made it possible to globalize educational programs in ways unheard of just a few short years ago. Michigan Tech has recently partnered with a not-for-profit educational foundation, the IILM Institute of Higher Education (IIHE), based in New Delhi, India, to develop a unique program in engineering education. In essence, Michigan Tech has opened a branch campus in India, recruiting students into programs in Chemical, Computer, Electrical, Materials, and Mechanical Engineering. Indian students enroll in the first two years of their engineering program in New Delhi and move to the Michigan Tech main campus for their final two years. By enabling Indian students to remain in New Delhi for the first two years of their program, an American engineering degree becomes an affordable option for many. The IIHE is responsible for teaching the Michigan Tech courses, utilizing syllabi developed by Michigan Tech faculty. IIHE is also responsible for identifying individuals to teach the courses, however, department chairs at Michigan Tech have final hiring approval for these faculty. This arrangement enables us to maintain quality assurance over the program in ways that would not be possible through a transfer agreement alone. IIHE faculty in India have been appointed as adjunct Michigan Tech faculty; students in India carry regular MTU student ID cards and have MTU computer accounts; administrative paperwork such as registration and grading is carried out at Michigan Tech. This paper describes the Michigan Tech-IIHE program and outlines our challenges and successes to date. Future plans for the program will also be discussed.*

1 THE PARTNERS

The program described in this paper stems from a partnership between two institutions of higher education—one in the US and one in India. Michigan Technological University is in many ways a unique institution of higher learning. From its beginning as a small focused college in 1885, Michigan Tech has evolved into a university offering a range of programs in science, engineering, technology, business, forestry, and special aspects of the humanities and social sciences. The college of engineering is 21st nationally in the number of engineering degrees awarded (623) (AY2001-02). Several of the engineering programs are among the largest in the nation in bachelor's degrees awarded in 2001-02, including Mechanical Engineering (7th with 280), Environmental Engineering (7th with 33), Chemical Engineering (12th with 107), and Materials Science & Engineering (13th with 39). *U.S. News & World Report* ranks Michigan Tech in the "top 50 public national universities."

The IILM Institute for Higher Education (IIHE) is a not-for-profit institution of higher education located in New Delhi, India that is operated by the Ram Krishan & Sons Charitable Trust. It is approved and licensed by the government of India. Mr. And Mrs. Anil Rai manage the charitable trust which has the resources necessary to invest in new educational initiatives. The Rai family has had over three generations of successful entrepreneurs active in steel, textiles, high tech manufacturing, and tourism. Over the past ten years, Mr. And Mrs. Rai have been expanding educational activities and philanthropic support for education and the arts.

2 THE EVOLUTION OF THE PARTNERSHIP

A delegation from IIHE visited the Michigan Tech campus during July 2002 to discuss the possibility of developing a partnership between the two institutions. Initial discussions were focused on a joint program involving Michigan Tech's School of Business, however, the Dean of Business did not wish to pursue a partnership at this time. During this visit, the IIHE delegation also met with the Dean of Engineering who expressed a strong interest in developing a joint 2+2 program between the two institutions for several engineering programs. The following represent the major milestones in the development of the program to date:

- In August 2002 IIHE sent an official letter of invitation proposing specific areas of cooperation in developing the 2+2 programs
- The letter was shared with appropriate department chairs within the College of Engineering at Michigan Tech
- The Center for International Education developed a draft proposal that was discussed among appropriate administrators at both institutes
- After thorough discussion among all affected campus constituencies, a final agreement was negotiated and executed between IIHE and Michigan Tech in February 2003
- In April 2003 a delegation from Michigan Tech visited the IIHE campus in New Delhi to view the facilities, meet with American Embassy official, and conduct a recruiting session among potential students
- Syllabi for all first-year Michigan Tech courses were supplied to cooperating faculty in IIHE
- Two faculty from IIHE attended a 3-day workshop on Michigan Tech's campus designed to show them our teaching methodologies and to further develop our partnership
- IIHE obtained approval from the Indian government to offer the educational program during the summer of 2003
- NCA regional accrediting agency gave Michigan Tech approval for offering the program in the summer of 2003 with a scheduled visit to the Indian campus in April 2004
- The first cohort of students enrolled in the program commencing in the fall of 2003

3 PROGRAM DETAILS

Through this program, Michigan Tech is able to offer the first two years of several of its engineering programs in New Delhi, India. IIHE offers Michigan Tech courses for the first two years of the following engineering programs: 1) Chemical, 2) Computer, 3) Electrical, 4) Materials, and 5) Mechanical. Michigan Tech provides syllabi for the courses in the first two years of the courses provides oversight and assessment to ensure that the courses are taught to our specifications. Indian students enroll in the Michigan Tech courses in New Delhi for the first two years of their engineering program and then move to the main campus for the final two years. Since the cost of an education in India is typically far less than the cost at an American university, this arrangement makes a US engineering degree far more affordable for Indian students.

It is important to note that this is not a transfer program but a true branch campus. Students who enroll in the program are issued Michigan Tech ID cards; students will have a true Michigan Tech transcript for all four years in the program; faculty who teach in the program are appointed as adjunct Michigan Tech faculty; courses in the program are taught as additional sections of the on-campus offerings. IIHE is responsible for marketing the program in India and for providing the facilities and instructional staff necessary to offer the courses. Michigan Tech departments have final approval authority for the Indian faculty who teach in the program.

Indian students pay a program fee to IIHE for the first two years of their studies. IIHE then pays a portion (around 40%) of this fee to Michigan Tech to cover the cost of administering the program. IIHE is responsible for securing all required equipment for the courses and for providing students with a residence option for their campus. When Indian students in the program begin their studies on Michigan Tech's campus, a portion of the tuition collected is returned to IIHE to provide scholarships for students. In the initial stages, the greatest cost has been for travel between the two institutions. Now in the first year of the program there are 10 students enrolled in two disciplines—mechanical and electrical engineering.

4 CHALLENGES AND SOLUTIONS

In the implementation of this novel program, we have encountered several challenges. One of the biggest hurdles we encountered was the lower than anticipated enrolment in the first year. There were several reasons identified as contributors to the relatively low demand for the program. Our inability to guarantee a visa to insure that the students can actually move to the main campus beginning in their third year of study is cited as the most significant factor that has limited enrolment growth for the program. Post-September 11 visa requirements for study in the US have hurt many international programs across the country and ours was not the exception. Since Indian universities will not accept transfer credits from Michigan Tech, the students at IIHE would have to start over to complete a BS in an engineering field if they are denied a visa for study in the US and must remain in India.

We have investigated many potential solutions to this problem, including partnering with a Canadian university who would be willing to accept Michigan Tech credits for transfer (since Indian students typically can easily obtain a visa for Canada). In the end, it was determined that the best course of action will be to provide a 4-year Michigan Tech engineering program on the New Delhi campus for students who are unable to obtain their visa. The program we will offer will not be our "regular" programs in chemical, computer, electrical, materials, or mechanical engineering but will be offered as part of our Bachelor of Science in Engineering program. The Bachelor of Science in Engineering (BSE) program at Michigan Tech has been around since the early 70s. The BSE program is fully accredited by ABET and consists of courses in four areas: 1) a General Education core, 2) a Math and science core, 3) an Engineering core, and 4) an Engineering Emphasis area. It is our intent that for this partnership we will develop an engineering emphasis area in mechatronics to meet the needs of our Indian students. By providing a single emphasis area, we will be able to streamline our operation in New Delhi and simplify our assessment and accreditation processes.

Another challenge that we have experienced is in equipping laboratories for our Indian campus. Procuring equipment is the responsibility of IIHE, however, due to financial constraints, it would be cost prohibitive to expect IIHE to purchase all of the equipment that our on-campus students have available to them. In the case of Chemistry and Physics labs, department chairs from the respective departments were able to travel to New Delhi and inspect available equipment. Through discussion they were able to develop a plan of action so that the basic science labs are acceptable in terms of course equivalencies. The equipment needs for the mechanical engineering manufacturing processes lab is a bit more problematic. IIHE partners identified an industrial training site in the New Delhi area that has most of the required equipment, however, most of it is fairly old. We are currently working with the course coordinator at Michigan Tech to determine if this equipment will meet the educational needs of the students. If no consensus on this issue can be reached, we will likely offer a different course in New Delhi next year—one that has no special equipment needs.

5 CONCLUSIONS

Michigan Tech and IIHE have successfully partnered to develop and implement a novel 2+2 program for several engineering disciplines. This is not merely a transfer program but is one where our Indian partner is offering Michigan Tech courses to Michigan Tech students taught by adjunct Michigan Tech faculty. Future plans call for establishing a 4-year bachelor of science in engineering program aimed especially at Indian students who are unable to obtain a visa for study in the US.